

SPACE DEBRIS SYMPOSIUM (A6)
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CORRELATION ANALYSIS AND MANEUVER ESTIMATION OF GEO OBJECTS WITH
SPACE-BASED VISIBLE SURVEILLANCE**Abstract**

Object correlation and maneuver detection are persistent problems in space surveillance and space object catalog maintenance, especially for Geosynchronous Earth Orbit(GEO) objects. There are currently over one thousand GEO satellites, and it is estimated that the number of 10 cm or larger debris objects in the GEO ring is over two thousand. Firstly, A space-based space surveillance system is designed which can effectively shorten the observation gaps of GEO objects. Secondly, a method of correlation analysis to determine the correlation between two too-short arcs is presented to monitor GEO objects with space-based visible surveillance system. The processing procedure of the correlation analysis for the two too-short arcs as well as correlation judgment method is analyzed. Finally, a model which can make maneuver estimations using the space-based visible surveillance observation is created. The C-W equation is used to model the relative motion of a GEO satellite about its intended location, and a nonlinear least squares algorithm is developed to estimate the satellite trajectories. Simulation results indicate that the designed space-based visible surveillance system can acquire two observation arcs in two successive orbital periods. The correlation judgment method is valid, and the GEO satellite maneuvers can be estimated using space-based visible observations.